Journal of Artificial Intelligence and Engineering Applications

Website: https://ioinformatic.org/

15th October 2024. Vol. 4. No. 1; e-ISSN: 2808-4519

Selection of Outstanding Course Participants for Award Recipients Using the Topsis Method of Case Studies of Multilogic Course Institutions

Riza Mahyuda[1]*, Rahmadani [2], Kristina Annatasia Br Sitepu[3]

[1, 3] STMIK Kaputama,[2] Universitas Pembangunan Panca Budi
donyarfani123@gmail.com[1*] , rahm4dani@gmail.com[2], kannatasia88@gmail.com[3]

Abstract

A course institution is an organization or institution that provides educational or training programs in various fields. This institution aims to improve the skills, knowledge, and competencies of course participants. Course institutions can operate formally or informally and offer different types of courses, ranging from short-term courses to more intensive programs. Examples of course institutions include vocational training centers, language schools, computer centers, and other professional educational institutions. In this study, the author wants to explain the determination of outstanding course participants by applying the TOPSIS method to get alternative students who are close to positive ideals and far from negative ideals, based on data on participant values, among others, course certificate assessment criteria, course average scores, skills, final project scores and attendance, the value of giving awards to participants in order to further improve the quality of participant achievement so that the participants are more enthusiasm in learning. The purpose of selecting outstanding students to give awards is to appreciate and recognize the efforts, abilities, and outstanding achievements shown by students. This award aims to motivate students to continue to excel, increase their enthusiasm for learning, and encourage healthy competition among participants. In addition, this award also serves as an inspiration for other students to strive to achieve the best results in their field of pursuit. After doing the preference value of each alternative, the largest score is owned by alternative V14 (Dwi Intan Sari) with a value of 0.801. It can be concluded that the recipient of the award for the outstanding participant in Multi Logika is Dwi Intan Sari.

Keywords: *Decision Support System, TOPSIS, Outstanding course participants*

1. Introduction

A course institution is an organization or institution that provides educational or training programs in various fields. This institution aims to improve the skills, knowledge, and competencies of course participants. Course institutions can operate formally or informally and offer different types of courses, ranging from short-term courses to more intensive programs. Examples of course institutions include vocational training centers, language schools, computer centers, and other professional educational institutions. The purpose of selecting outstanding students to give awards is to appreciate and recognize the efforts, abilities, and outstanding achievements shown by students. This award aims to motivate students to continue to excel, increase their enthusiasm for learning, and encourage healthy competition among participants. In addition, this award also serves as an inspiration for other students to strive to achieve the best results in their field of pursuit. The research was conducted by [1], with the research title "Application of the TOPSIS Method for Recommendations for the Determination of Outstanding Students Receiving Annual Awards at the High School Level". The conclusion of this study is that recommendations for outstanding students who receive the right annual awards are obtained based on the results with variables that are considered to be able to provide recommendations for outstanding students with criteria such as average report cards, attendance, class rank, manners, extracurriculars, and non-academic achievements [2].

2. Theoretical Foundations

2.1. Decision Support System

Decision is the activity of choosing a strategy or action in solving problems. Decision-making is the act of choosing a strategy or action that the manager believes will provide the best solution to something. According to [3] stated " The Decision Support System (DSS) is an interactive system that supports decisions in the decision-making process through alternatives obtained from data processing results". This decision support system helps management decision-making by combining data, complex models and analysis tools, and software that is familiar with the user's interface into a powerful system that can support semi-or unstructured decisions [4].

2.2. Metode Technique For Order For By Similarity To Ideal Solution (TOPSIS)

The TOPSIS (Technique For Others Reference by Similarity to Ideal Solution) method was chosen because the concept is simple and easy to understand, the computation is efficient and has the ability to measure the relative performance of alternative decisions in a simple mathematical form. This method is expected to help the selection of outstanding course participants and those that are in accordance with expectations. The advantages of the TOPSIS method in decision-making on complex or easy-to-use problems and can take into account all types of criteria (subjective and objective), as well as a simple, easy-to-understand calculation process and important weights can be easily entered [5].

2.3. Definition of Course

A course participant is an individual or group who participates in an education or training program to improve knowledge, skills, or competencies in a certain field. Course participants can come from a variety of backgrounds and have diverse goals, such as advancing their careers, learning new skills, or meeting certain professional requirements [6].

2.4. Cursor Participant

Course participants are individuals who are enrolled in a particular learning or training program. Course participants can come from a variety of backgrounds, such as students, professionals, or anyone who wants to improve their skills or knowledge in a particular field. They typically take courses to achieve specific goals, such as obtaining certification, improving job skills, or pursuing personal interests [7].

2.5. PHP: Hypertext Preprocessor

PHP stands for PHP: Hypertext Preprocessor**.** As the name implies, PHP is used to create personal websites.According to [8] "PHP is a server-side scripting language designed for web development, called a server-side language because PHP is processed on a computer server. Since PHP is server-side scripting, PHP syntax and commands will be executed on the server and then sent to the browser in html format.

2.6. Laravel

Laravel is a PHP-based web application framework designed for elegant, expressive, and efficient web application development. This framework provides various tools and features that make it easier for developers to build web applications, such as routing, authentication, caching, and management [8], [9], [10], [11].

2.7. Mysql

The reliability of a database system (DBMS) can be known from the way its optimization works in executing the process of SQL commands made by users and application programs that use it. As a database server, MySQL supports both transactional database operations and non-transactional database operations. According to (e.g.Budi Raharjo), MySQL is an open source SQL database management system that is the most popular today. The MySQL database system supports several features such as multithreaded, multi user and SQL database management system (DBMS). This database is made for the purpose of a database system that is fast, reliable and easy to use.

3. Analysis and Design

3.1. Application of TOPSIS

In this method, it explains the design of the TOPSIS method and the model of outstanding course participants at the Multi Logic Institute, there are weights and several criteria needed for outstanding course participants for award recipients.

3.1.1. Research Supporting Data

This is the data to support the research used, where the course participant data below is the data of course participants at the Multi Logic course institution is as follows.

Table 1: Research Supporting Data

Alternative	Criterion				
	Certificate	Average Score	Skills	Final Project Value	Presence
Silvira Eno Pratiwi	3 Certificate	70-80	61-70	71-80	<60%
Nadia Mariska	>4 Certificate	>90	71-80	81-90	>60% - 75%
Raffa Fadlan	>4 Certificate	>90	61-70	71-80	<60%
Aridho	3 Certificate	>90	61-70	71-80	>60% - 75%
Dela Indrawati Sitepu	>4 Certificate	>90	71-80	81-90	<60%
Kayla Hendrithania	3 Certificate	70-80	71-80	81-90	100%
Zahra Eka Wahyuni	>4 Certificate	>90	61-70	71-80	<60%

Mutiara Oktavia	>4 Certificate	>90	81-90	91-100	>75% - 90%
Dimas Perdiansyah Pratama	3 Certificate	70-80	61-70	71-80	>60% - 75%
Zahrotus Shita	>4 Certificate	>90	61-70	71-80	>60% - 75%
Nabila Adellia	3 Certificate	>90	81-90	91-100	<60%
Putri Khaliqah Fatnin	3 Certificate	70-80	81-90	91-100	100%
Nadya Pasyha	>4 Certificate	>90	61-70	71-80	>60% - 75%
Dwi Intan Sari	3 Certificate	>90	61-70	71-80	>75% - 90%
Asyifa	>4 Certificate	>90	81-90	91-100	>60% - 75%
Adellia Syahara	>4 Certificate	>90	81-90	91-100	>75% - 90%
Agus Tiara	3 Certificate	>90	61-70	71-80	<60%
Rani Aprilia	>4 Certificate	>90	71-80	81-90	>75% - 90%
Dhea Amanda	0-2 Certificate	60-70	81-90	91-100	100%
Tama Rahadi	0-2 Certificate	>90	81-90	91-100	>75% - 90%

3.1.2. Data Criterion

Criterion data is a criterion used for the selection of outstanding students to receive awards. Each criterion has a criterion weight according to the level of importance between the criteria which will later become a parameter in the assessment.

Table 2: Research Variable Criteria

No	Criterion Name	Symbol	Weight of Criteria	Preferred Weights
1	Course Certificate	C1	10	0,10
2	Course Grade Point Average	C2	30	0,30
3	Skills	C3	20	0,20
4	Final Project Value	C4	20	0,20
5	Presence	C5	20	0,20
Total			100	1.00

Based on the table above, there are 4 criteria used in the selection process for outstanding course participants to receive awards at the Multi Logic Institute. The four criteria used are Benefit, namely Course Certificate, Course Average Score, skills or abilities, being active in class and attendance are Cost criteria. For the Benefit criterion, the priority value is determined based on the highest score. Likewise, vice versa with the Cost criterion which is prioritized based on the lowest niali. Each criterion has a different weight value, so it has a varying level of priority, the greater the weight value, the higher the priority of the criteria used.

The following is an analysis of the score of each criterion at the stage of determining outstanding course participants to receive awards as follows:

Tabble 3: Sertifikat Kursus (C1)

No	Classification	Value
1	0-2 Certificate	1
2	3 Certificate	2
3	>4 Certificate	3

Table 4: Course Grade Point Average (C2)

No	Classification	Value
1	60-70	1
2	70-80	2
3	>90	3

Table 5: Skills (C4)

No	Classification	Value
1	<60	1
2	61 - 70	2
3	71 - 80	3
4	81 - 90	4
5	91 - 100	5

Table 6: Final Project Value (C3)

No	Classification	Value
1	61 - 70	1
2	71 - 80	2
3	81 - 90	3
4	91 - 100	4

Table 7: Attendance (C5)

No	Classification	Value
1	<60%	1
2	>60%-75%	2
3	>75%-90%	3
4	100%	4

3.1.3. Calculation Simulation of the TOPSIS Method

Below are some of the participants of the Multi Logic Institute course that are used as case examples in this study.

Table 8: Course Participant Data

No	Name	C1	C2	C3	C4	C5
1	Silvira Eno Pratiwi	2	2	3	2	1
2	Nadia Mariska	3	3	3	3	2
3	Raffa Fadlan	3	3	4	2	1
4	Arridho	2	3	2	2	2
5	Dela Indriawati Sitepu	3	3	3	3	1
6	Kayla Hendrithania	2	2	2	3	4
7	Zahra Eka Wahyuni	3	3	2	2	1
8	Mutiara Oktavia	3	3	4	4	3
9	Dimas Perdiansyah Pratama	2	2	3	2	2
10	Zahrotus Shita	3	3	4	2	2
11	Nabila Adellia	2	3	4	4	1
12	Putri Khaliqah Fatnin	2	2	4	4	4
13	Nadya Pasyha	3	3	2	2	2
14	Dwi Intan Sari	2	3	1	2	3
15	Asyifa	3	3	2	4	2
16	Adellia Syahara	3	3	2	4	3
17	Agus Tiara	2	3	4	2	1
18	Rani Aprilia	3	3	3	3	3
19	Dhea Amanda	1	1	4	4	4
20	Tama Rahadi	1	3	4	4	3

The next step is to determine the normalization value of the Y-weighted matrix by multiplying the R matrix by the preference weight. So that the following results were obtained.

Table 9: Y-Weighted Matrix

No	Name	C1	C2	C3	C4	C5
1	Silvira Eno Pratiwi	0,180	0,162	0,213	0,147	0,090
2	Nadia Mariska	0,269	0,243	0,213	0,221	0,180
3	Raffa Fadlan	0,269	0,243	0,284	0,147	0,090
4	Arridho	0,180	0,243	0,142	0,147	0,180
5	Dela Indriawati Sitepu	0,269	0,243	0,213	0,221	0,090
6	Kayla Hendrithania	0,180	0,162	0,142	0,221	0,361
7	Zahra Eka Wahyuni	0,269	0,243	0,142	0,147	0,090
8	Mutiara Oktavia	0,269	0,243	0,284	0,295	0,271
9	Dimas Perdiansyah Pratama	0,180	0,162	0,213	0,147	0,180
10	Zahrotus Shita	0,269	0,243	0,284	0,147	0,180
11	Nabila Adellia	0,180	0,243	0,284	0,295	0,090
12	Putri Khaliqah Fatnin	0,180	0,162	0,284	0,295	0,361
13	Nadya Pasyha	0,269	0,243	0,142	0,147	0,271
14	Dwi Intan Sari	0,180	0,243	0,071	0,147	0,271
15	Asyifa	0,269	0,243	0,142	0,295	0,180
16	Adellia Syahara	0,269	0,243	0,142	0,295	0,271
17	Agus Tiara	0,180	0,243	0,284	0,147	0,090
18	Rani Aprilia	0,269	0,243	0,213	0,221	0,271
19	Kayla Hendrithania	0,090	0,081	0,284	0,295	0,361
20	Zahra Eka Wahyuni	0,090	0,243	0,284	0,295	0,271

Once the normalization calculation of the Y-weighted matrix is found, the next step is to determine the positive ideal solution (A+), with the equation.

$A+_1$ = max {0,180; 0,269; 0,269; 0,180; 0,269; 0,180; 0,269; 0,269; 0,180; 0,269;0,180; 0,269; 0,269; 0,180; 0,269; 0,090; 0,090; 0,180; 0,269} = **0,269**
$A+_2$ = max {0,162; 0,243; 0,243; 0,243; 0,243; 0,243; 0,162; 0,243; 0,243; 0,162;0,243; 0,243; 0,243; 0,243; 0,243; 0,081 0,243; 0,162; 0,243} = **0,243**
$A+_3$ = max {0,213; 0,213; 0,284; 0,142; 0,213; 0,142; 0,142; 0,284; 0,213; 0,284;0,284; 0,284; 0,142; 0,071; 0,142; 0,142; 0,284; 0,213; 0,284; 0,284} = **0,284**
$A+_4$= max {0,147; 0,221; 0,147; 0,147; 0,221; 0,221; 0,147; 0,295; 0,147; 0,147;0,295; 0,295; 0,147; 0,147; 0,295; 0,295; 0,147; 0,221; 0,295; 0,295} = **0,295**
$A+_5$ = max {0,090; 0,180; 0,090; 0,180; 0,090; 0,361; 0,090; 0,271; 0,180; 0,180; 0,090; 0,361; 0,271; 0,271; 0,180; 0,271; 0,090; 0,271; 361; 0,271;} = **0,090**

Then continue by calculating the negative ideal solution (A-) with the equation

$A-_1$ = min {0,180; 0,269; 0,269; 0,180; 0,269; 0,180; 0,269; 0,269; 0,180; 0,269;0,180; 0,269; 0,269; 0,180; 0,269; 0,090; 0,090; 0,180; 0,269} = **0,180**
$A-_2$ = min {0,162; 0,243; 0,243; 0,243; 0,243; 0,243; 0,162; 0,243; 0,243; 0,162;0,243; 0,243; 0,243; 0,243; 0,243; 0,081 0,243; 0,162; 0,243} = **0,162**

A^-_3 = min {0,213; 0,213; 0,284; 0,142; 0,213; 0,142; 0,142; 0,284; 0,213; 0,284;0,284; 0,284; 0,142; 0,071; 0,142; 0,142; 0,284; 0,213; 0,284; 0,284} = **0,071**
A^-_4= min {0,147; 0,221; 0,147; 0,147; 0,221; 0,221; 0,147; 0,295; 0,147; 0,147;0,295; 0,295; 0,147; 0,147; 0,295; 0,295; 0,147; 0,221; 0,295; 0,295} = **0,147**
A^-_5 = min {0,090; 0,180; 0,090; 0,180; 0,090; 0,361; 0,090; 0,271; 0,180; 0,180;0,090; 0,361; 0,271; 0,271; 0,180; 0,271; 0,090; 0,271; 361; 0,271;} = **0,271**

From the calculation above, positive and negative ideal negative results are obtained as shown in the table below:

Table 10: The Ideal Solution

Solusi Ideal	C1	C2	C3	C4	C5
A+	0,269	0,243	0,284	0,295	0,090
A-	0,180	0,162	0,071	0,147	0,271

After finding the value of the positive ideal solution (A+) and the negative ideal solution (A-), continue to calculate the distance of each alternative to the positive ideal solution (D+) which is calculated with the equation below:

D^+_1 = 0,203
D^+_2 = 0,136
D^+_3 = 0,147
D^+_4 = 0,240
D^+_5 = 0,102
D^+_6 = 0,336
D^+_7 = 0,204
D^+_8 = 0,222
D^+_9 = 0,319
D^+_{10} = 0,089
D^+_{11} = 0,296
D^+_{12} = 0,272
D^+_{13} = 0,296
D^+_{14} = 0,328
D^+_{15} = 0,168
D^+_{16} = 0,229
D^+_{17} = 0,172
D^+_{18} = 0,207
D^+_{19} = 0,362
D^+_{20} = 0,254

Then continue by calculating the negative ideal solution (D-) with the following equation:

D^-_1 = 0,230
D^-_2 = 0,220
D^-_3 = 0,304
D^-_4 = 0,141
D^-_5 = 0,270
D^-_6 = 0,136
D^-_7 = 0,228
D^-_8 = 0,286
D^-_9 = 0,168
D^-_{10} = 0,261
D^-_{11} = 0,326
D^-_{12} = 0,274
D^-_{13} = 0,140
D^-_{14} = 0,081
D^-_{15} = 0,223
D^-_{16} = 0,203
D^-_{17} = 0,291
D^-_{18} = 0,200
D^-_{19} = 0,300
D^-_{20} = 0,286

Then calculate the preference value for each alternative based on the equation below:

V_1 = 0,469
V_2 = 0,382
V_3 = 0,326
V_4 = 0,630
V_5 = 0,274
V_6 = 0,711
V7 = 0,472

$V_8 = 0,386$
$V_9 = 0,568$
$V_{10} = 0,550$
$V_{11} = 0,214$
$V_{12} = 0,519$
$V_{13} = 0,660$
$V_{14} = 0, 801$
$V_{15} = 0, 429$
$V_{16} = 0, 529$
$V_{17} = 0,529$
$V_{18} = 0,372$
$V_{19} = 0,547$
$V_{20} = 0,470$

After doing the preference value of each alternative, the largest score is owned by alternative V14 (Dwi Intan Sari) with a value of 0.801. It can be concluded that the recipient of the award for the outstanding participant in Multi Logika is Dwi Intan Sari.

4. Interface Discussion

4.1. Discussion

At this stage, it is a stage to outline the discussion and analysis of the program from the results of the program that has been made.

4.1.1. Main Menu Form

This form is the initial display of the program to select several menu options, as in the image below:

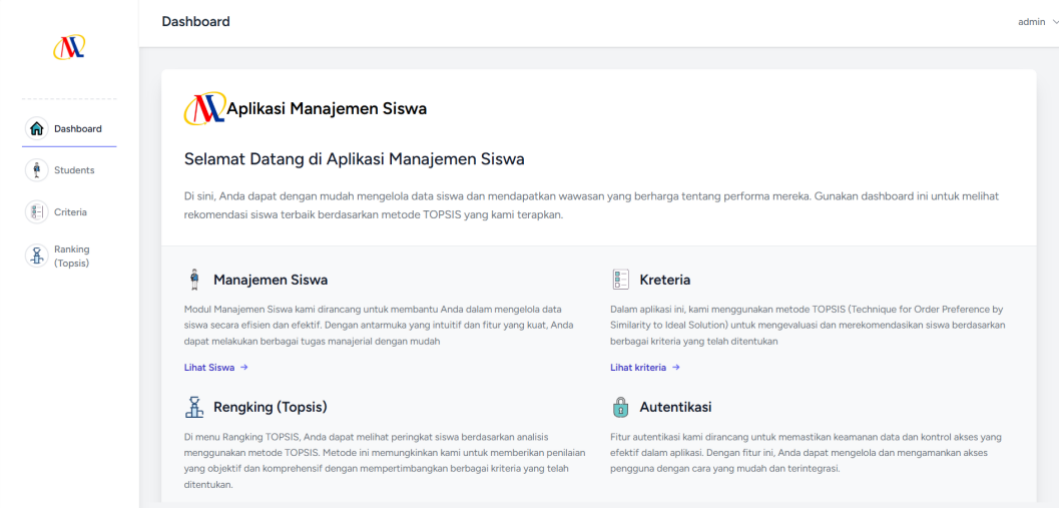


Fig. 1: Main Menu Form

4.1.2. Form Kriteria

In this form are some of the criteria needed for determining outstanding course participants.

Fig. 2: Outstanding Course Participant Criteria Form

4.1.3. Difilter Criteria

Refined criteria are standards or benchmarks that are used as a basis for making decisions or judgments. The following is a breakdown of the criteria for outstanding course participants.

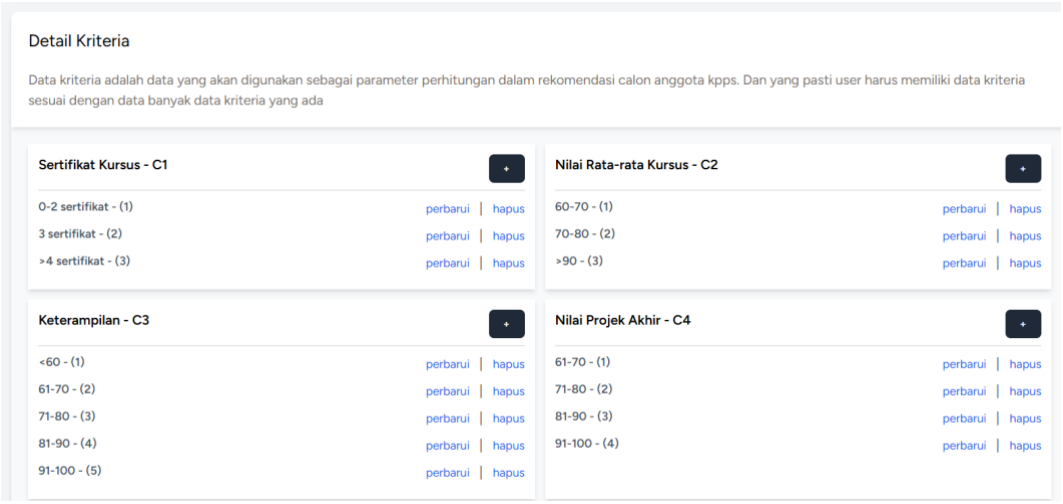


Fig. 3: Form Sub Kriteria

4.1.4. Analysis Form

In this analysis form, it is the result of data input to determine the assessment of course participants and the weight that has been converted to the number of values from each alternative in each criterion. As seen in the image below:

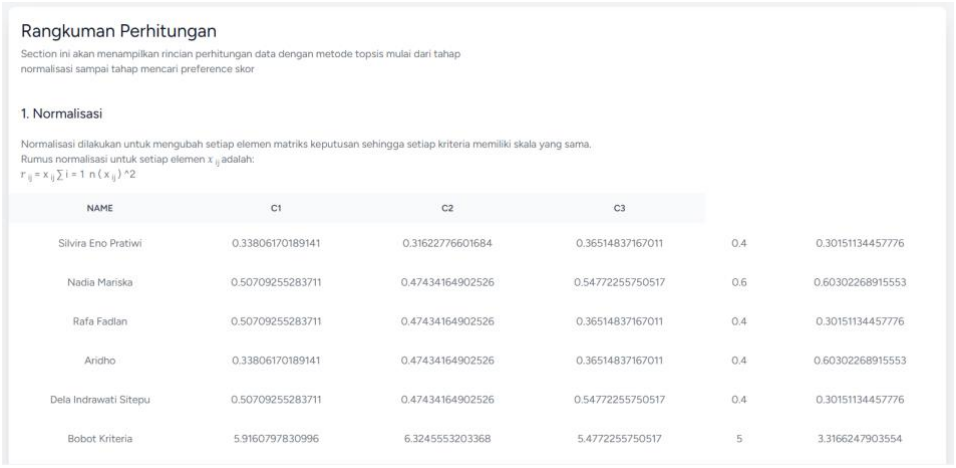


Fig. 4: Analysis Form

4.1.5. Form Ranking

After carrying out the process, it will automatically generate a ranking form for determining outstanding course participants who are the best course participants among the existing course participants so that the results of the decision to determine the course participants to receive awards can be obtained.

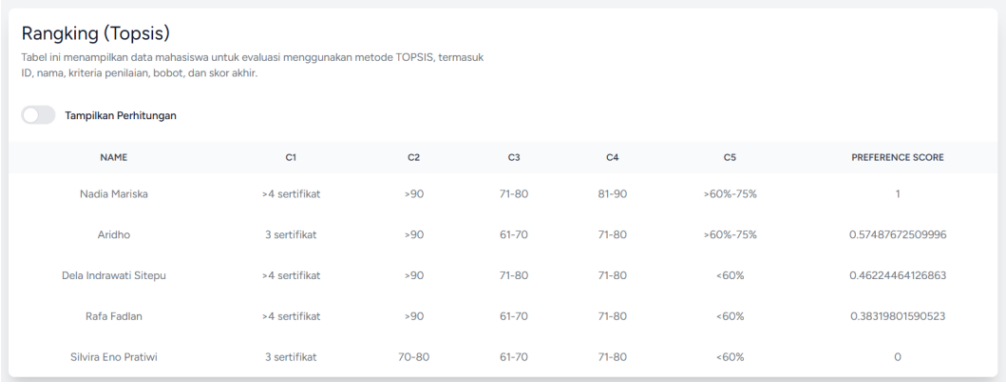
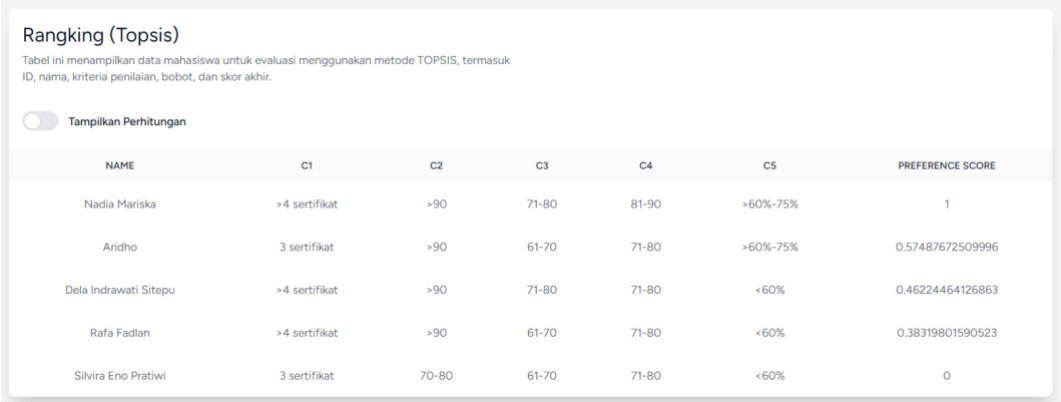


Fig. 5: Form Ranking

4.1.6. Implementation Results

The following are the results of the implementation of the decision on the application of determining the facilitator's performance assessment.



NAME	C1	C2	C3	C4	C5	PREFERENCE SCORE
Nadia Mariska	>4 sertifikat	>90	71-80	81-90	>60%-75%	1
Aridho	3 sertifikat	>90	61-70	71-80	>60%-75%	0.57487672509996
Dela Indrawati Sitepu	>4 sertifikat	>90	71-80	71-80	<60%	0.46224464126863
Rafa Fadlan	>4 sertifikat	>90	61-70	71-80	<60%	0.38319801590523
Silvira Eno Pratiwi	3 sertifikat	70-80	61-70	71-80	<60%	0

Fig. 6: Results

From the results of the PSI calculation that can be seen in figure IV.6 above, it can be concluded that from the 5 course participants who have been processed in the calculation of the TOPSIS method, course participants 2 are obtained as an alternative with the highest score, namely 1, meaning that A2 is the one who is an outstanding course participant so that they will receive an award.

5. Conclusion

With the results of the application of the decision support system for determining the performance assessment of facilitators, the author can draw several conclusions, namely as follows:

With the construction of this support system, it can make it easier to select outstanding course participants to receive awards at the Multi Logic Institute.Objective decision-making The TOPSIS method allows the evaluation of outstanding course participants based on a number of criteria that have been determined. Each participant was assessed objectively based on their distance from the ideal solution and the negative solution. The construction of this decision support system is a tool in developing course participants at the Multi Logic Institute from seeing or identifying according to the criteria of outstanding course participants to receive awards using the TOPSIS method. This award aims to motivate students to continue to excel, increase their enthusiasm for learning, and encourage healthy competition among participants. In addition, this award also serves as an inspiration for other students to strive to achieve the best results in their field of pursuit. After doing the preference value of each alternative, the largest score is owned by alternative V14 (Dwi Intan Sari) with a value of 0.801. It can be concluded that the recipient of the award for the outstanding participant in Multi Logika is Dwi Intan Sari.

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